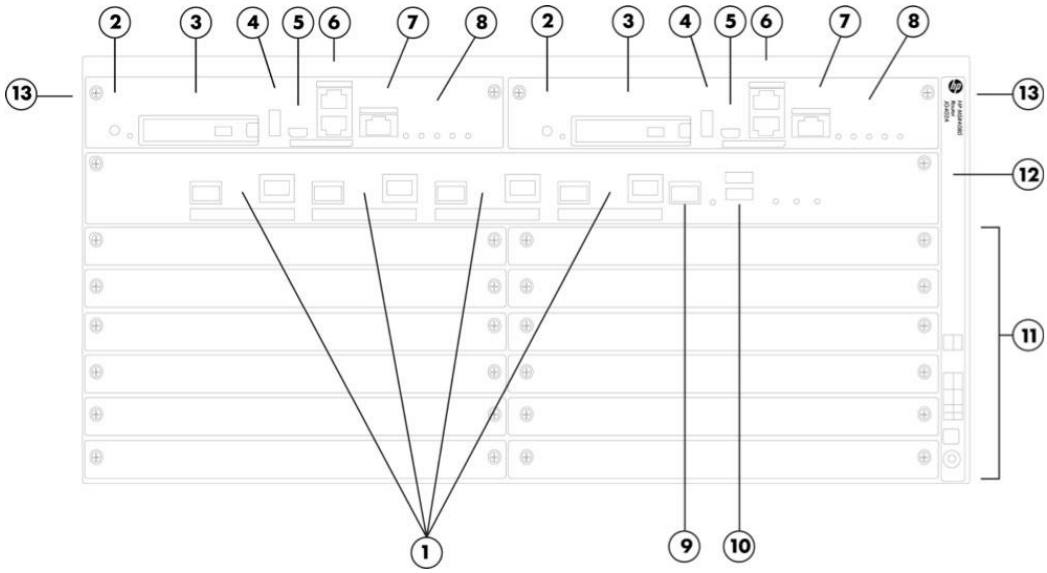
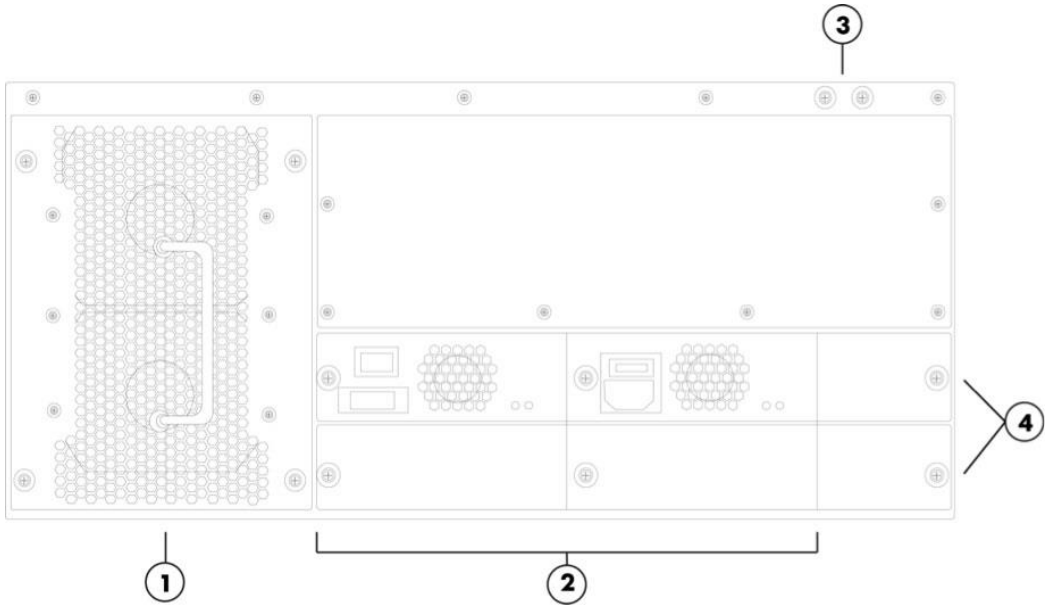
Overview

HP MSR4000 Series



HP MSR4080 Router Chassis (SPU-200) - Front View

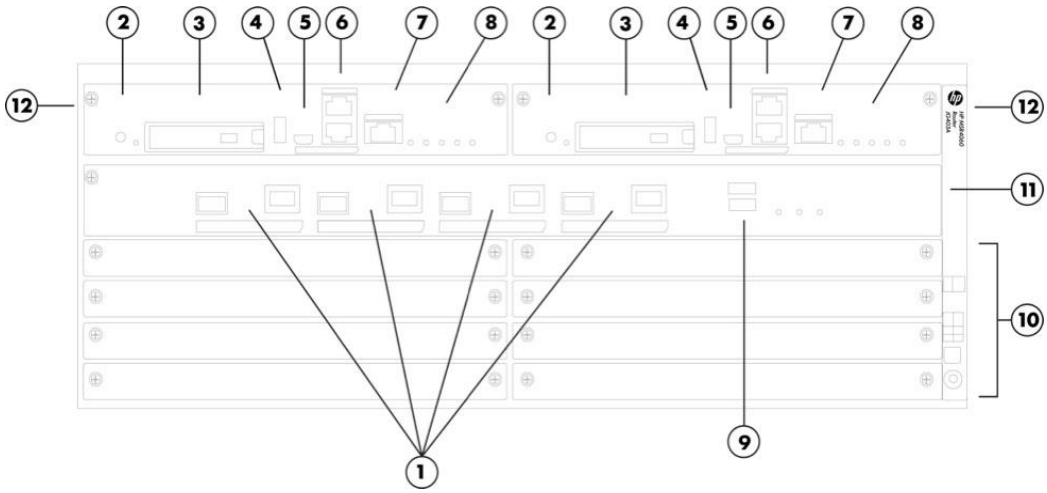
1. 4 Fixed COMBO 1000M RJ45/SFP ports
2. Reset Button
3. CF Card Slot
4. USB Port
5. USB console port
6. CON/AUX port
7. Management Port
8. System Activity LEDs
9. SFP+ port
10. 2 USB 2.0 Port for 3G modem and USB disk
11. 8-HMIM modules slot (4 Half Height + 4 Full Height Slots)
12. Service Processing Unit (SPU)
13. Main Processing Units (MPU)



HP MSR4080 Router Chassis - Rear View

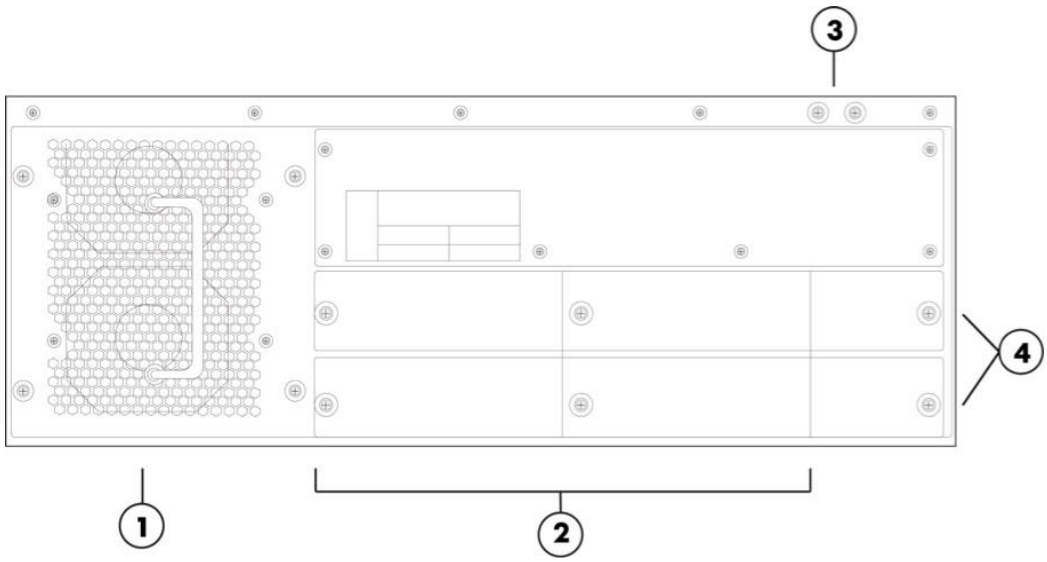
1. Fan tray
2. Power Supplies
3. Grounding Terminal
4. Filler panels of the PoE power supply slots

Overview



HP MSR4060 Router Chassis(SPU-100) - Front View

1. 4 Fixed COMBO 1000M RJ45/SFP ports
2. Reset Button
3. CF Card Slot
4. USB Port
5. USB console port
6. CON/AUX port
7. Management Port
8. System Activity LEDs
9. 2 USB 2.0 Port for 3G modem and USB disk
10. 6-HMIM modules slot (4 Half Height + 2 Full Height Slots)
11. Service Processing Unit
12. Main Processing Units



HP MSR4060 Router Chassis - Rear View

1. Fan Tray
2. Power Supplies
3. Grounding Terminal
4. Filler panels of the PoE power supply slots

Models

HP MSR4060 Router Chassis	JG403A
HP MSR4080 Router Chassis	JG402A

Key features

- Up to 36 Mpps forwarding performance; support for multiple concurrent services
- High reliability with separated hardware data and control planes, and dual MPUs
- Open Application Platform for HP AllianceOne applications

Overview

- Powerful aggregation capacity; integrated 10GbE; support for up to 64 E1 or eight E3/T3 ports
- Zero-touch solution with single pane-of-glass management

Product overview

The HP MSR4000 Router Series, the next generation of router from HP, is a component of the HP FlexBranch solution, which is a part of the comprehensive HP FlexNetwork architecture. These routers feature a modular design that delivers unmatched application services for extra-large branch offices, headquarters, and campuses. This gives your IT personnel the benefit of reduced complexity, and simplified configuration, deployment, and management. The MSR4000 series leverages separated data and control planes, dual main processing units (MPUs), and support for up to four power supplies, which provides outstanding performance and reliability.

The MSR4000 routers provide a full-featured, resilient routing platform with the latest multicore CPUs, offer 10 Gigabit SFP+ integrated, provide an enhanced PCI bus, and ship with the latest version of HP Comware software to help ensure high performance with concurrent services. The MSR4000 series provides a full-featured, resilient routing platform, including IPv6 and MPLS, with up to 36 Mpps forwarding capacity and 28 Gbps of IPSec VPN encrypted throughput. These routers also support HP Open Application Platform (OAP) modules to deliver integrated industry-leading HP AllianceOne partner applications such as virtualization, unified communications and collaboration (UC&C), and application optimization capabilities.

The MSR4000 series provides an agile, flexible network infrastructure that enables you to quickly adapt to your changing business requirements while delivering integrated concurrent services on a single, easy-to-manage platform.

Features and benefits

Performance

- **Excellent forwarding performance**
  provides forwarding performance up to 20 Mpps (13.4 Gb/s); meets the bandwidth-intensive application demands of enterprise businesses
- **Powerful security capacity**
  provides forwarding performance up to 20 Mpps (13.4 Gb/s); meets the bandwidth-intensive application demands of enterprise businesses

Product architecture

- **Ideal multiservice platform**
  provides WAN router, Ethernet switch, firewall, VPN, and SIP/voice gateway all in one device
- **Advanced hardware architecture**
  provides multicore processors, gigabit switching, and PCIE bus; dual Main Processing Units, four internal power supplies (N+1
  configuration), and internal and external CF cards are offered; new high-performance MIM modules (HMIM) supported
- **New operation system version**
  ships with new Comware v7 operating system delivering the latest in virtualization and routing
- **Open Application Platform architecture**
  provides unmatched application and services flexibility, with the potential to deliver the functionality of multiple devices, creating capital and operational expense savings and lasting investment protection
- **Distributed architecture with separation of data and control planes**
  delivers enhanced fault tolerance and facilitates near continuous operation and zero service disruption during planned or unplanned control-plane events; service processing units (SPUs) perform data forwarding, encryption/decryption, and analyzing/filtering of data packets; main processing units perform route calculation, forward table maintenance, and configure and monitor the SPU
- **Field-programmable gate array (FPGA)**
  improves the bandwidth of SIC module slots from 100 Mb/s to 1000 Mb/s, and improves uplink performance from 1 Gb/s to 10 Gb/s

Overview

- **Multi Gigabit Fabric (MGF)**
  eases utilization of the main processor by transmitting Layer 2 packets directly via the MGF
- **Main processing unit (MPU)**
  provides 1 GbE management port; has default of 512 MB internal CF and 2 GB DDR3 memory
- **Service processing units (SPU)**
  includes four 1000BASE-T and four SFP (Combo) slots, two voice processing module slo

Connectivity

- **Powerful aggregation capacity**
  supports integrated 10GbE LAN, and up to 64 E1 or eight E3/T3 ports
- **High-density port connectivity**
  provides up to eight interface module slots and up to four on-board Gigabit Ethernet and one 10GbE ports
- **Multiple WAN interfaces**
  provides traditional links with E1, T1, Serial, and ISDN; high-density Ethernet access with WAN Fast Ethernet and Gigabit Ethernet; and high-speed E3/T3, 155 Mb/s OC3 access options
- **Packet storm protection**
  protects against broadcast, multicast, or unicast storms with user-defined thresholds
- **Loopback**
  supports internal loopback testing for maintenance purposes and an increase in availability; loopback detection protects against incorrect cabling or network configurations and can be enabled on a per-port or per-VLAN basis for added flexibility
- **USB interface**
  uses USB memory disk to download and upload configuration/OS image files; supports an external USB 3G/4G modem for a 3G/4G WAN uplink
- **Flexible port selection**
  provides a combination of fiber and copper interface modules, 100/1000BASE-X support, and 10/100/1000BASE-T auto-speed detection plus auto duplex and MDI/MDI-X

Layer 2 switching

- **Spanning Tree Protocol (STP)**
  supports standard IEEE 802.1D STP, IEEE 802.1w Rapid Spanning Tree Protocol (RSTP) for faster convergence, and IEEE 802.1s Multiple Spanning Tree Protocol (MSTP)
- **Internet Group Management Protocol (IGMP) and Multicast Listener Discovery (MLD) protocol snooping**
  controls and manages the flooding of multicast packets in a Layer 2 network
- **Port mirroring**
  duplicates port traffic (ingress and egress) to a local or remote
  monitoring port
- **VLANs**
  supports up to 4,094 VLANS or IEEE 802.1Q-based VLANs
- **sFlow**
  allows traffic sampling

Layer 3 routing

- **Static IPv4 routing**
  provides simple manually configured IPv4 routing
- **Routing Information Protocol (RIP)**
  uses a distance vector algorithm with UDP packets for route determination; supports RIPv1 and RIPv2 routing; includes loop protection
- **Open shortest path first (OSPF)**
  delivers faster convergence; uses this link-state routing Interior Gateway Protocol (IGP), which supports ECMP, NSSA, and MD5 authentication for increased security and graceful restart for faster failure recovery

Overview

- **Border Gateway Protocol 4 (BGP-4)**
  delivers an implementation of the Exterior Gateway Protocol (EGP) utilizing path vectors; uses TCP for enhanced reliability for the route discovery process; reduces bandwidth consumption by advertising only incremental updates; supports extensive policies for increased flexibility; scales to very large networks
- **Intermediate system to intermediate system (IS-IS)**
  uses a path vector Interior Gateway Protocol (IGP), which is defined by the ISO organization for IS-IS routing and extended by IETF RFC 1195 to operate in both TCP/IP and the OSI reference model (Integrated IS-IS)
- **Static IPv6 routing**
  provides simple manually configured IPv6 routing
- **Dual IP stack**
  maintains separate stacks for IPv4 and IPv6 to ease the transition from an IPv4-only network to an IPv6-only network design
- **Routing Information Protocol next generation (RIPng)**
  extends RIPv2 to support IPv6 addressing
- **OSPFv3**
  provides OSPF support for IPv6
- **BGP+**
  extends BGP-4 to support Multiprotocol BGP (MBGP), including support for IPv6 addressing
- **IS-IS for IPv6**
  extends IS-IS to support IPv6 addressing
- **IPv6 tunneling**
  allows IPv6 packets to traverse IPv4-only networks by encapsulating the IPv6 packet into a standard IPv4 packet; supports manually configured, 6to4, and Intra-Site Automatic Tunnel Addressing Protocol (ISATAP) tunnels; is an important element for the transition from IPv4 to IPv6
- **Multiprotocol Label Switching (MPLS)**
  uses BGP to advertise routes across Label Switched Paths (LSPs), but uses simple labels to forward packets from any Layer 2 or Layer 3 protocol, which reduces complexity and increases performance; supports graceful restart for reduced failure impact; supports LSP tunneling and multilevel stacks
- **Multiprotocol Label Switching (MPLS) Layer 3 VPN**
  allows Layer 3 VPNs across a provider network; uses Multiprotocol BGP (MP-BGP) to establish private routes for increased security; supports RFC 2547bis multiple autonomous system VPNs for added flexibility; supports IPv6 MPLS VPN
- **Multiprotocol Label Switching (MPLS) Layer 2 VPN**
  establishes simple Layer 2 point-to-point VPNs across a provider network using only MPLS Label Distribution Protocol (LDP); requires no routing and therefore decreases complexity, increases performance, and allows VPNs of non-routable protocols; uses no routing information for increased security; supports Circuit Cross Connect (CCC), Static Virtual Circuits (SVCs), Martini draft, and Kompella-draft technologies
- **Routing policy**
  allows custom filters for increased performance and security; supports ACLs, IP prefix, AS paths, community lists, and aggregate policies

Layer 3 services

- **Address Resolution Protocol (ARP)**
  determines the MAC address of another IP host in the same subnet; supports static ARPs; gratuitous ARP allows detection of duplicate IP addresses; proxy ARP allows normal ARP operation between subnets or when subnets are separated by a Layer 2 network
- **User Datagram Protocol (UDP) helper**
  redirects UDP broadcasts to specific IP subnets to prevent server spoofing
- **Dynamic Host Configuration Protocol (DHCP)**
  simplifies the management of large IP networks and supports client and server; DHCP Relay enables DHCP operation across subnets

Quality of Service (QoS)

Overview

- **Hierarchical quality of service (HQoS)/Nested QoS**
  manages traffic uniformly, and hierarchically schedules traffic by user, network service, and application; provides more granular traffic control and quality assurance services than traditional QoS
- **Traffic policing**
  supports Committed Access Rate (CAR) and line rate
- **Congestion management**
  supports FIFO, PQ, CQ, WFQ, CBQ, and RTPQ
- **Weighted random early detection (WRED)/random early detection (RED)**
  delivers congestion avoidance capabilities through the use of queue management algorithms
- **Other QoS technologies**
  supports traffic shaping, MPLS QoS, and MP QoS/LFI

Security

- **Dynamic Virtual Private Network (DVPN)**
  collects, maintains, and distributes dynamic public addresses through the VPN Address Management (VAM) protocol, making VPN establishment available between enterprise branches that use dynamic addresses to access the public network; compared to traditional VPN technologies, DVPN technology is more flexible and has richer features, such as NAT traversal of DVPN packets, AAA identity authentication, IPSec protection of data packets, and multiple VPN domain
- **IPSec VPN**
  supports DES, 3DES, and AES 128/192/256 encryption, and MD5 and SHA-1 authentication
- **Access control list (ACL)**
  supports powerful ACLs for both IPv4 and IPv6; ACLs are used for filtering traffic to prevent unauthorized users from accessing the network, or for controlling network traffic to save resources; rules can either deny or permit traffic to be forwarded; rules can be based on a Layer 2 header or a Layer 3 protocol header; rules can be set to operate on specific dates or times
- **Terminal Access Controller Access-Control System (TACACS+)**
  delivers an authentication tool using TCP with encryption of the full authentication request, providing additional security
- **Unicast Reverse Path Forwarding (URPF)**
  allows normal packets to be forwarded correctly, but discards the attaching packet due to lack of reverse path route or incorrect inbound interface; prevents source spoofing and distributed attacks
- **Network login**
  allows authentication of multiple users per port
- **RADIUS**
  eases security access administration by using a user/password authentication server
- **Network address translation (NAT)**
  supports one-to-one NAT, many-to-many NAT, and NAT control, enabling NAT-PT to support multiple connections; supports blacklist in NAT/NAT-PT, a limit on the number of connections, session logs, and multi-instances
- **Secure Shell (SSHv2)**
  uses external servers to securely log in into a remote device; with authentication and encryption, it protects against IP spoofing and plain text password interception; increases the security of SFTP transfers

Convergence

- **Internet Group Management Protocol (IGMP)**
  utilizes Any-Source Multicast (ASM) or Source-Specific Multicast (SSM) to manage IPv4 multicast networks; supports IGMPv1, v2, and v3
- **Protocol Independent Multicast (PIM)**
  defines modes of Internet IPv4 and IPv6 multicasting to allow one-to-many and many-to-many transmission of information; supports PIM Dense Mode (DM), Sparse Mode (SM), and Source-Specific Mode (SSM)
- **Multicast Source Discovery Protocol (MSDP)**
  allows multiple PIM-SM domains to interoperate; is used for inter-domain multicast applications
- **Multicast Border Gateway Protocol (MBGP)**

Overview

allows multicast traffic to be forwarded across BGP networks and kept separate from unicast traffic

Integration

- **Embedded VPN and firewall**
  provides enhanced stateful packet inspection and filtering; delivers advanced VPN services with Triple DES (3DES) and Advanced Encryption Standard (AES) encryption at high performance and low latency, Web content filtering, and application prioritization and enhancement
- **Embedded NetStream**
  improves traffic distribution using powerful scheduling algorithms, including Layer 4 to 7 services; monitors the health status of servers and firewalls
- **SIP trunking**
  delivers multiple concurrent calls on one link; the carrier authenticates only the link, rather than carrying each SIP call on the link

Resiliency and high availability

- **Backup Center**
  acts as a part of the management and backup function to provide backup for device interfaces; delivers reliability by switching traffic over to a backup interface when the primary one fails
- **Virtual Router Redundancy Protocol (VRRP)**
  allows groups of two routers to dynamically back each other up to create highly available routed environments; supports VRRP load balancing
- **In-Service Software Upgrade (ISSU)**
  lowers downtime caused by planned maintenance and software upgrades
- **Embedded Automation Architecture (EAA)**
  monitors the internal event and status of system hardware and software, identifying potential problems as early as possible;
  collects field information and attempts to automatically repair the issues; based on the user configuration, onsite nformation ill be sent to technical support
- **Multiple internal power supply slots**
  delivers higher reliability with a maximum of four internal power supplies, which can be installed
- **Bidirectional Forwarding Detection (BFD)**
  detects quickly the failures of the bidirectional forwarding paths between two devices for upper-layer protocols such as routing protocols and MPLS.

Management

- **HP Intelligent Management Center (IMC)**
  integrates fault management, element configuration, and network monitoring from a central vantage point; built-in support for third-party devices enables network administrators to centrally manage all network elements with a variety of automated tasks, including discovery, categorization, baseline configurations, and software images; the software also provides configuration comparison tools, version tracking, change alerts, and more
- **Industry-standard CLI with a hierarchical structure**
  reduces training time and expenses, and increases productivity in multivendor installations
- **Management security**
  restricts access to critical configuration commands; offers multiple privilege levels with password protection; ACLs provide telnet and SNMP access; local and remote syslog capabilities allow logging of all access
- **SNMPv1, v2, and v3**
  provide complete support of SNMP; provide full support of industry-standard Management Information Base (MIB) plus private extensions; SNMPv3 supports increased security using encryption
- **Remote monitoring (RMON)**
  uses standard SNMP to monitor essential network functions; supports events, alarm, history, and statistics group plus a private alarm extension group

Overview

- **FTP, TFTP, and SFTP support**
  offers different mechanisms for configuration updates; FTP allows bidirectional transfers over a TCP/IP network; trivial FTP (TFTP) is a simpler method using User Datagram Protocol (UDP); Secure File Transfer Protocol (SFTP) runs over an SSH tunnel to provide additional security
- **Debug and sampler utility**
  supports ping and traceroute for both IPv4 and IPv6
- **Network Time Protocol (NTP)**
  synchronizes timekeeping among distributed time servers and clients; keeps timekeeping consistent among all clock-dependent devices within the network so that the devices can provide diverse applications based on the consistent time
- **Information center**
  provides a central repository for system and network information; aggregates all logs, traps, and debugging information generated by the system and maintains them in order of severity; outputs the network information to multiple channels based on user-defined rules
- **Management interface control**
  provides management access through modem port and terminal interface; provides access through terminal interface, telnet, or SSH
- **Network Quality Analyzer (NQA)**
  analyzes network performance and service quality by sending test packets, and provides network performance and service quality parameters such as jitter, TCP, or FTP connection delays; allows network manager to determine overall network performance and diagnose and locate network congestion points or failures
- **Role-based security**
  delivers role-based access control (RBAC); supports 16 user levels (0~15)
- **Standards-based authentication support for LDAP**
  integrates seamlessly into existing authentication services

Ease of deployment

- **Zero-touch deployment**
  supports both USB disk auto deployment and 3G SMS auto deployment

Additional information

- **OPEX savings**
  simplifies and streamlines deployment, management, and training through the use of a common operating system, thereby cutting costs as well as reducing the risk of human errors associated with having to manage multiple operating systems across different platforms and network layers
- **Faster time to market**
  allows new and custom features to be brought rapidly to market through engineering efficiencies, delivering better initial and ongoing stability
- **Green initiative support**
  provides support for RoHS and WEEE regulations

Warranty and support

- **1-year Warranty 2.0**
  advance hardware replacement with 10-calendar-day delivery (available in most countries)
- **Electronic and telephone support (for Warranty 2.0)**
  limited electronic and 24x7 telephone support is available from HP for the entire warranty period; to reach our support centers, refer to www.hp.com/networking/contact-support; for details on the duration of support provided with your product purchase, refer to www.hp.com/networking/warrantysummary
- **Software releases**
  to find software for your product, refer to www.hp.com/networking/support; for details on the software releases

Overview

available with your product purchase, refer to www.hp.com/networking/warrantysummary

Configuration

Build To Order:

BTO is a standalone unit with no integration. BTO products ship standalone are not part of a CTO or Rack-Shippable solution.

Router Chassis

HP MSR4080 Router Chassis JG402A

- Must select 1 Main Processing Unit
- Must select 1 Service Processing Unit
- Must select 1 Power Supply
- 8-HMIM modules slot (4 Half Height + 4 Full Height Slots)
- 5U - Height

HP MSR4060 Router Chassis JG403A

- Must select 1 Main Processing Unit
- Must select 1 Service Processing Unit
- Must select 1 Power Supply
- 6-HMIM modules slot (4 Half Height + 2 Full Height Slots)
- 4U - Height

Box Level Integration CTO Models

CTO Router Chassis

HP MSR CTO Router Solution JG500A

- SSP trigger sku

HP MSR4080 Router Chassis JG402A

- Must select 1 Main Processing Unit
- Must select 1 Service Processing Unit
- Must select 1 Power Supply
- 8-HMIM modules slot (4 Half Height + 4 Full Height Slots)
- 5U - Height

See Configuration Note:1

HP MSR4060 Router Chassis JG403A

- Must select 1 Main Processing Unit
- Must select 1 Service Processing Unit
- Must select 1 Power Supply
- 6-HMIM modules slot (4 Half Height + 2 Full Height Slots)
- 4U - Height

See Configuration Note:1

Configuration Rules:

Note 1 If the Router Chassis is to be Box Level Factory Integrated (CTO), Then the #0D1 is required on the Router Chassis and integrated to the JG500A - HP MSR CTO Enablement. (Min 1/Max 1 Router per SSP)

Configuration

Rack Level Integration CTO Models

Router Chassis

HP MSR4080 Router Chassis — JG402A

- Must select 1 Main Processing Unit
- Must select 1 Service Processing Unit
- Must select 1 Power Supply
- 8-HMIM modules slot (4 Half Height + 4 Full Height Slots)
- 5U - Height

See Configuration Note:1

HP MSR4060 Router Chassis — JG403A

- Must select 1 Main Processing Unit
- Must select 1 Service Processing Unit
- Must select 1 Power Supply
- 6-HMIM modules slot (4 Half Height + 2 Full Height Slots)
- 4U - Height

See Configuration Note:1

Configuration Rules:

Note 1 If the CTO Router Chassis needs to be racked, Then the CTO Base Model needs to integrate (with #0D1) to the HP Networking Rack.

Power Supplies

System (std 0// max 4) User Selection (min 1 // max 2 or max 4) per MSR4000 Router Chassis

HP X351 300W DC Power Supply — JG528A

See Configuration Note:4, 6

HP X351 300W 100-240VAC to 12VDC Power Supply — JG527A

See Configuration Note:1, 2, 4, 6

PDU Cable NA/MEX/TW/JP — JG527A#B2B

- C15 PDU Jumper Cord (NA/MEX/TW/JP)

PDU Cable ROW — JG527A#B2C

- C15 PDU Jumper Cord (ROW)

High Volt Switch to Wall Power Cord — JG527A#B2E

- NEMA L6-20P Cord (NA/MEX/JP/TW)

Configuration

HP 5800 750W AC PoE Power Supply — JC089A
See Configuration Note:1, 5, 6

PDU Cable NA/MEX/TW/JP — JC089A#B2B
- C15 PDU Jumper Cord (NA/MEX/TW/JP)

PDU Cable ROW — JC089A#B2C
- C15 PDU Jumper Cord (ROW)

Configuration Rules:

Note 1 Localization required on orders without #B2B, #B2C or #B2E options.

Note 2 If #B2E is selected Then replace Localized option with #B2E for power supply and with #B2E for switch . (Offered only in NA, Mexico,, Taiwan, and Japan)

Note 4 Maximum of 4 of this Power Supply for MSR4080 - JG402A and MSR4060 - JG403A.
min=0\ max=4

Note 5 Maximum of 2 of this Power Supply for MSR4080 - JG402A and MSR4060 - JG403A
min=0\ max=2

Note 6 Power Supplies cannot be mixed in the same Router enclosure

Remarks:

Drop down under power supply should offer the following options and results:
Switch/Router/Power Supply to PDU Power Cord - #B2B in North America, Mexico, Taiwan, and Japan or #B2C ROW. (Watson Default B2B or B2C for Rack Level CTO)
Switch/Router/Power Supply to Wall Power Cord - Localized Option (Watson Default for BTO and Box Level CTO)
High Volt Switch/Router/Power Supply to Wall Power Cord - #B2E Option. (Offered only in North America, Mexico, Taiwan, and Japan)
Configurator Blue Text:
HP 5800 750W AC PoE Power Supply (JC089A) is only supported in slot 1 and slot 3 in the MSR4000 Router Chassis.

Enter the following menu selections as integrated to the CTO Model X server above if order is factory built.

Main Processing Units

HP MSR4000 MPU-100 Main Processing Unit — JG412A
See Configuration Note:1, 2, 3, 5
- default=2GB \ max=4GB DDR SDRAM (4GB Max, by replacing existing single 2GB SDRAM)
- External CF Card slot - Default 0 // max 1 CF Card

Configuration Rules:

Configuration

Note 1 Service Processing Units (JG670A, JG413A or JG414A) must be selected with the Main Processing Unit (JG412A/JG869A)

Note 2 The following DDR SDRAM install into this Module:

HP X610 4GB DDR3 SDRAM UDIMM Memory (Must remove existing 2GB UDIMM to install the 4GB UDIMM)	JG530A

Note 3 The following CF Card install into this Module:

HP X600 256M Compact Flash Card	JC686A
HP X600 512M Compact Flash Card	JC685A
HP X600 1G Compact Flash Card	JC684A

Note 5 No mixing of any type of MPU. Must all be the same sku.

Service Processing Units

HP MSR4000 SPU-100 Service Processing Unit — JG413A

- 4 Fixed COMBO 1000M RJ45/SFP ports
- min=0 \ max=4 SFP Transceivers
- min=0 \ max=2 VPM Modules
- default=2GB \ max=2GB DDR SDRAM

See Configuration Note:1, 2

HP MSR4000 SPU-200 Service Processing Unit — JG414A

- 4 Fixed COMBO 1000M RJ45/SFP ports
- min=0 \ max=4 SFP Transceivers
- 1 - SFP+ Port
- min=0 \ max=1 SFP+ Transceiver
- min=0 \ max=2 VPM Modules
- default=2GB \ max=2GB DDR SDRAM

See Configuration Note:1, 2, 3

HP MSR4000 SPU-300 Svc Processing Unit — JG670A

- 4 Fixed COMBO 1000M RJ45/SFP ports
- min=0 \ max=4 SFP Transceivers
- 1 - SFP+ Port
- min=0 \ max=1 SFP+ Transceiver
- min=0 \ max=2 VPM Modules
- default=2GB \ max=2GB DDR SDRAM

See Configuration Note:1, 2, 3

Configuration Rules:

Note 1 The following SFP Transceivers install into this SPU:

HP X120 1G SFP LC SX Transceiver	JD118B
HP X120 1G SFP LC LX Transceiver	JD119B
HP X125 1G SFP LC LH40 1310nm Transceiver	JD061A
HP X120 1G SFP LC LH40 1550nm Transceiver	JD062A
HP X125 1G SFP LC LH70 Transceiver	JD063B
HP X120 1G SFP LC LH100 Transceiver	JD103A

Configuration

	HP X115 100M SFP LC FX Transceiver	JD102B
	HP X110 100M SFP LC LX Transceiver	JD120B
	HP X110 100M SFP LC LH40 Transceiver	JD090A
	HP X110 100M SFP LC LH80 Transceiver	JD091A
	HP X120 1G SFP LC BX 10-U Transceiver	JD098B
	HP X120 1G SFP LC BX 10-D Transceiver	JD099B
Note 2	The following VPM Modules install into this SPU:	
	HP MSR G2 128-channel Voice Processing Module	JG417A
Note 3	The following SFP+ Transceivers install into this SPU:	
	HP X130 10G SFP+ LC SR Transceiver	JD092B
	HP X130 10G SFP+ LC LRM Transceiver	JD093B
	HP X130 10G SFP+ LC LR Transceiver	JD094B
	HP X130 10G SFP+ LC ER 40km Transceiver	JG234A
	HP X240 10G SFP+ to SFP+ 0.65m Direct Attach Copper Cable	JD095C
	HP X240 10G SFP+ to SFP+ 1.2m Direct Attach Copper Cable	JD096C
	HP X240 10G SFP+ to SFP+ 3m Direct Attach Copper Cable	JD097C
	HP X240 10G SFP+ to SFP+ 5m Direct Attach Copper Cable	JG081C

HMIM Modules

System (std 0 // max 6 or 8) User Selection (min 0 // max 6 or 8) per Router Chassis (See Modules for Port information)

HP MSR 1-port E1 Voice HMIM Module — JG429A
- (Full Height Module; Takes up 1 - Full Height slot or 2 - Half Height slots, vertically) min=0 \ max=1 E1 Cable

See Configuration Note:1, 3, 5, 11

HP MSR 1-port T1 Voice HMIM Module — JG430A
- (Full Height Module; Takes up 1 - Full Height slot or 2 - Half Height slots, vertically) min=0 \ max=1 E1 Cable

See Configuration Note:1 ,3, 10, 11

HP MSR 2-port E1 Voice HMIM Module — JG431A
- (Full Height Module; Takes up 1 - Full Height slot or 2 - Half Height slots, vertically) min=0 \ max=1 E1 Cable

See Configuration Note:1, 3, 5, 11

HP MSR 1-port T3 / CT3 / FT3 HMIM Module — JG435A
- (Half Height Module; Takes up 1 Half Height or 1 Full Height slot) min=0 \ max=2 E3/T3 Cable

See Configuration Note:2 ,4 ,6

HP MSR 1-port E3 / CE3 / FE3 HMIM Module — JG436A
- (Half Height Module; Takes up 1 Half Height or 1 Full Height slot) min=0 \ max=2 E3/T3 Cable

See Configuration Note:2, 4, 6

Configuration

HP MSR 1-port OC-3c / STM-1c POS HMIM Module • (Half Height Module; Takes up 1 Half Height or 1 Full Height slot) min=0 \ max=1 SFP Transceiver	JG438A See Configuration Note:2, 4, 7
HP MSR 4-port Enhanced Sync / Async Serial HMIM Module • (Half Height Module; Takes up 1 Half Height or 1 Full Height slot) min=0 \ max=4 Serial Port Cable	JG442A See Configuration Note:2, 4, 8
HP MSR 8-port Enhanced Sync / Async Serial HMIM Module • (Half Height Module; Takes up 1 Half Height or 1 Full Height slot) min=0 \ max=8 Serial Port Cable	JG443A See Configuration Note:2, 4, 8
HP MSR 4-port FXS HMIM Module • (Half Height Module; Takes up 1 Half Height or 1 Full Height slot)	JG446A See Configuration Note:2, 4
HP MSR 4-port FXO HMIM Module • (Half Height Module; Takes up 1 Half Height or 1 Full Height slot)	JG447A See Configuration Note:2, 4
HP MSR 4-port E&M HMIM Module • (Half Height Module; Takes up 1 Half Height or 1 Full Height slot)	JG448A See Configuration Note:2, 4
HP MSR 2-port E1 / CE1 / PRI HMIM Module • (Half Height Module; Takes up 1 Half Height or 1 Full Height slot) min=0 \ max=2 E1 Cable	JG450A See Configuration Note:2, 4, 5
HP MSR 4-port E1 / CE1 / PRI HMIM Module • (Half Height Module; Takes up 1 Half Height or 1 Full Height slot) min=0 \ max=4 E1 Cable	JG451A See Configuration Note:2, 4, 5
HP MSR 8-port E1 / CE1 / PRI (75ohm) HMIM Module • (Half Height Module; Takes up 1 Half Height or 1 Full Height slot) min=0 \ max=1 8E1 Cable	JG452A See Configuration Note:2, 4, 9
HP MSR 4-port E1 / Fractional E1 HMIM Module • (Half Height Module; Takes up 1 Half Height or 1 Full Height slot) min=0 \ max=4 E1 Cable	JG453A See Configuration Note:2, 4, 5
HP MSR 2-port T1 / CT1 / PRI HMIM Module	JG456A

Configuration

- (Half Height Module; Takes up 1 Half Height or 1 Full Height slot) — See Configuration Note:2, 4

HP MSR 4-port T1 / Fractional T1 HMIM Module — JG457A
- (Half Height Module; Takes up 1 Half Height or 1 Full Height slot) — See Configuration Note:2, 4

HP MSR 2p Gig-T HMIM Mod — JG420A
- (Half Height Module; Takes up 1 Half Height or 1 Full Height slot) — See Configuration Note:2, 4

HP MSR 4p Gig-T HMIM Mod — JG421A
- (Half Height Module; Takes up 1 Half Height or 1 Full Height slot) — See Configuration Note:2, 4

HP MSR 8p Gig-T HMIM Mod — JG422A
- (Half Height Module; Takes up 1 Half Height or 1 Full Height slot) — See Configuration Note:2, 4

HP MSR 2p 1000BASE-X HMIM Mod — JG423A
- (Half Height Module; Takes up 1 Half Height or 1 Full Height slot) — See Configuration Note:2, 4, 14
- min=0 \ max=2 SFP Modules

HP MSR 4p 1000BASE-X HMIM Mod — JG424A
- (Half Height Module; Takes up 1 Half Height or 1 Full Height slot) — See Configuration Note:2, 4, 14
- min=0 \ max=4 SFP Modules

HP MSR 8p 1000BASE-X HMIM Mod — JG425A
- (Half Height Module; Takes up 1 Half Height or 1 Full Height slot) — See Configuration Note:2, 4, 14
- min=0 \ max=8 SFP Modules

HP MSR 24p Gig-T Switch HMIM Mod — JG426A
- (Full Height Module; Takes up 1 - Full Height slot or 2 - Half Height slots, vertically) — See Configuration Note:1, 3, 11

HP MSR 24p Gig-T PoE Switch HMIM Mod — JG427A
- (Full Height Module; Takes up 1 - Full Height slot or 2 - Half Height slots, vertically) — See Configuration Note:1, 3, 11

HP MSR 1p OC-3/STM-1 CPOS HMIM Mod — JG428A
- (Half Height Module; Takes up 1 Half Height or 1 Full Height slot) — See Configuration Note:2, 4, 7
- min=0 \ max=1 SFP Transceiver

HP MSR 2p T1 Voice HMIM Mod — JG432A
- (Full Height Module; Takes up 1 - Full Height slot or 2 - Half Height slots, vertically) — See Configuration Note:1, 3, 10
- min=0 \ max=2 T1 Cable

Configuration

HP MSR 16p FXS HMIM Mod — JG434A
- (Full Height Module; Takes up 1 - Full Height slot or 2 - Half Height slots, vertically) — See Configuration Note:1, 3

HP MSR 8p BASE-T/2p Combo Swch HMIM Mod — JG741A
- (Half Height Module; Takes up 1 Half Height or 1 Full Height slot) — See Configuration Note:2, 4, 7, 14
- min=0 \ max=2 SFP Transceivers

HP MSR 1U HMIM Adapter Module — JG416A#B01
- (Half Height Module; Takes up 1 Half Height or 1 Full Height slot) — See Configuration Note:2, 4, 12

HP MSR 0.5U HMIM Adapter Module — JG415A#B01
- (Half Height Module; Takes up 1 Half Height or 1 Full Height slot) — See Configuration Note:2, 4, 13

Configuration Rules:

Note 1 — These Modules can install directly to the Router Chassis (JG402A)
min=0\ max=6 per enclosure (Full Height Module; Takes up 1 - Full Height slot or 2 - Half Height slots, vertically)

Note 2 — These Modules can install directly to the Router Chassis (JG402A)
min=0\ max=8 per enclosure

Note 3 — These Modules can install directly to the Router Chassis (JG403A)
min=0\ max=4 per enclosure (Full Height Module; Takes up 1 - Full Height slot or 2 - Half Height slots, vertically)

Note 4 — These Modules can install directly to the Router Chassis (JG403A)
min=0\ max=6 per enclosure

Note 5 — The following Cables install into this Module:

HP X260 E1 (2) BNC 75 ohm 3m Router Cable	JD175A
HP X260 E1 BNC 20m Router Cable	JD514A
HP X260 E1 2 BNC 75 ohm 40m Router Cable	JD516A
HP X260 E1 RJ45 3m Router Cable	JD509A
HP X260 E1 RJ45 20m Router Cable	JD517A

Note 6 — The following E3/T3 Cable and Connector install into this Module:

HP X260 T3/E3 Router Cable	JD531A
HP X260 E3-30 E3/T3 Router Cable	JD533A

Note 7 — The following Transceivers install into this Module:

HP X115 100M SFP LC FX Transceiver	JD102B
HP X110 100M SFP LC LX Transceiver	JD120B
HP X110 100M SFP LC LH40 Transceiver	JD090A
HP X110 100M SFP LC LH80 Transceiver	JD091A

Note 8 — The following Cables install into this Module:

HP X260 RS449 3m DCE Serial Port Cable	JF826A

Configuration

	HP X260 RS449 3m DTE Serial Port Cable	JF825A
	HP X200 X.21 DCE 3m Serial Port Cable	JD529A
	HP X200 V.24 DTE 3m Serial Port Cable	JD519A
	HP X200 V.35 DTE 3m Serial Port Cable	JD523A
	HP X260 RS530 3m DTE Serial Port Cable	JF827A
	HP X200 V.35 DCE 3m Serial Port Cable	JD525A
	HP X260 RS530 3m DCE Serial Port Cable	JF828A
	HP X200 V.24 DCE 3m Serial Port Cable	JD521A
	HP X200 X.21 DTE 3m Serial Port Cable	JD527A
Note 9	The following Cable install into this Module:	
	HP X260 8E1 BNC 75 ohm 3m Router Cable	JD512A
Note 10	The following T1 Cables install into this Module:	
	HP X260 T1 Router Cable	JD518A
Note 11	Full Height Module; Takes up 1 - Full Height slot or 2 - Half Height slots, vertically	
Note 12	1U HMIM Adapter Modules can adapt the following MIM Modules:	
	HP A-MSR 1-port E1 Voice MIM Module	JD565B
	HP A-MSR 2-port E1 Voice MIM Module	JD567B
	HP A-MSR 1-port T1 Voice MIM Module	JD566B
	HP A-MSR 2-port T1 Voice MIM Module	JD568B
	HP 16-port FXS Voice Interface MIM Module	JF822A
	HP MSR 16-port Async Serial Interface MIM Module	JF841A
	HP MSR OAP MIM Mod w/VMware vSphere	JG532A
Note 13	0.5U HMIM Adapter Modules can adapt following MIM Modules:	
	HP MSR 8-port Async Serial Interface MIM Module	JF840A
	HP MSR 1-port FT3/CT3 MIM Module	JD628A
	HP MSR 1-port FE3/CE3 MIM Module	JD630A
	HP MSR 1-port OC-3c/STM-1c POS MIM Module	JG193A
	HP MSR 2-port Enhanced Serial MIM Mod	JD540A
	HP MSR 4-port Enhanced Serial MIM Module	JD541A
	HP MSR 8-port Sync/Async Interface Enhanced Module	JD552A
	HP MSR 4-port FXS MIM Module	JD553A
	HP MSR 4-port FXO MIM Module	JD542A
	HP MSR 4-port Voice E and M MIM Module	JD539A
	HP A-MSR 2-port E1/CE1/PRI MIM Module	JD544B
	HP A-MSR 4-port E1/CE1/PRI MIM Module	JD550B
	HP MSR 8-port E1/CE1/PRI (75ohm) MIM Module	JD563A
	HP MSR 4-port E1/Fractional E1 MIM Module	JF257B
	HP MSR 8-port Fractional E1 MIM Module	JF255A
	HP MSR 2-port Fractional T1/Channelize T1 PRI MIM Module	JD549A
	HP MSR 4-port T1/Fractional T1 MIM Module	JF254B
	HP 6600 8-port T1 MIM Router Module	JC160A
	HP 6600 8-port Fractional T1 MIM Router Module	JC159A
	HP MSR 2-port 10/100 MIM Module	JD613A
	HP MSR 4-port 10/100BASE-TX Module	JD551A

Configuration

	HP MSR 2-port Gig-T MIM Module	JD548A
	HP MSR 2-port FXO MIM Module	JD543A
	HP 4-port ISDN BRI S/T Voice Interface MIM Module	JF837A
Note 14	The following Transceivers install into this Module:	
	HP X120 1G SFP LC SX Transceiver	JD118B
	HP X120 1G SFP LC LX Transceiver	JD119B
	HP X125 1G SFP LC LH40 1310nm Transceiver	JD061A
	HP X120 1G SFP LC LH40 1550nm Transceiver	JD062A
	HP X125 1G SFP LC LH70 Transceiver	JD063B
	HP X120 1G SFP LC BX 10-U Transceiver	JD098B
	HP X120 1G SFP LC BX 10-D Transceiver	JD099B
	HP X120 1G SFP LC LH100 Transceiver	JD103A

Remarks: PoE Module JG427A can be used a non-POE module on chassis without PoE power supplies.

MIM Modules

HP MSR OAP MIM Mod w/VMware vSphere — JG532A
See Configuration Note:1, 2

Note 1 This Module installs into JG416A.
JG402A min=0\ max=6 per enclosure
JG403A min=0\ max=4 per enclosure

Note 2 A Minimum of 2 Power Supplies are required when more than 2 OAP Modules are selected.

VPM Modules

HP MSR G2 128-channel Voice Processing Module — JG417A
See Configuration Note:1

Configuration Rules:

Note 1 These Modules can install directly to the Service Processing Unit
min=0\ max=2 per SPU

Transceivers

SFP Transceivers

System (std 0 // max 4) User Selection (min 0 // max 4) per SPU

HP X120 1G SFP LC SX Transceiver — JD118B

HP X120 1G SFP LC LX Transceiver — JD119B

HP X125 1G SFP LC LH40 1310nm Transceiver — JD061A

Configuration

HP X120 1G SFP LC LH40 1550nm Transceiver	JD062A
HP X125 1G SFP LC LH70 Transceiver	JD063B
HP X110 100M SFP LC LH40 Transceiver	JD090A
HP X110 100M SFP LC LH80 Transceiver	JD091A
HP X115 100M SFP LC FX Transceiver	JD102B
HP X110 100M SFP LC LX Transceiver	JD120B
HP X120 1G SFP LC LH100 Transceiver	JD103A
HP X120 1G SFP LC BX 10-U Transceiver	JD098B
HP X120 1G SFP LC BX 10-D Transceiver	JD099B

SFP+ Transceivers

HP X130 10G SFP+ LC SR Transceiver	JD092B
HP X130 10G SFP+ LC LRM Transceiver	JD093B
HP X130 10G SFP+ LC LR Transceiver	JD094B
HP X130 10G SFP+ LC ER 40km Transceiver	JG234A
HP X240 10G SFP+ SFP+ 0.65m DAC Cable	JD095C#B01
HP X240 10G SFP+ SFP+ 1.2m DAC Cable	JD096C#B01
HP X240 10G SFP+ SFP+ 3m DAC Cable	JD097C#B01
HP X240 10G SFP+ SFP+ 5m DAC Cable	JG081C#B01

Cables

HP X200 V.24 DTE 3m Serial Port Cable	JD519A
HP X200 V.24 DCE 3m Serial Port Cable	JD521A
HP X200 V.35 DTE 3m Serial Port Cable	JD523A
HP X200 V.35 DCE 3m Serial Port Cable	JD525A
HP X200 X.21 DTE 3m Serial Port Cable	JD527A

Configuration

HP X200 X.21 DCE 3m Serial Port Cable	JD529A
HP X260 RS449 3m DTE Serial Port Cable	JF825A
HP X260 RS449 3m DCE Serial Port Cable	JF826A
HP X260 RS530 3m DTE Serial Port Cable	JF827A
HP X260 RS530 3m DCE Serial Port Cable	JF828A
HP X260 Auxiliary Router Cable	JD508A
HP X260 E1 RJ45 3m Router Cable	JD509A
HP X260 E1 RJ45 20m Router Cable	JD517A
HP X260 E1 (2) BNC 75 ohm 3m Rtr Cable	JD175A
HP X260 E1 BNC 20m Router Cable	JD514A
HP X260 E1/2 BNC 75 ohm 40m Router Cable	JD516A
HP X260 E1 RJ45 BNC 75-120 ohm Conversion Router Cable	JD511A
HP X260 T1 Router Cable	JD518A
HP X260 T1 Voice Router Cable	JD535A
HP X260 T3/E3 Router Cable	JD531A
HP X260 E3-30 E3/T3 Router Cable	JD533A
HP X260 8E1 BNC 75 ohm 3m Router Cable	JD512A

Configuration Rules:

Remarks: The following cable is used for RJ45 BNC Conversion -
HP X260 E1 RJ45 BNC 75-120 ohm Conversion Router Cable JD511A

The following Connector is used to extend E1/T1 Cables:
HP X260 T1 Voice Router Cable JD535A

Router Enclosure Options

SDRAM

User Selection (min 0 // max 1) (default=2GB \ max=4GB) per MPU-100 Main Processing Unit (4GB Max, by replacing existing single 2GB SDRAM)

Configuration

HP X610 2GB DDR3 SDRAM UDIMM Memory JG529A

- Spare Only (Parts List Only)

HP X610 4GB DDR3 SDRAM UDIMM Memory JG530A

- (Must remove existing 2GB UDIMM to install the 4GB UDIMM)

Compact Flash Card

System (std 0 // max 1 External CF Card) per MPU

HP X600 1G Compact Flash Card JC684A

HP X600 512M Compact Flash Card JC685A

HP X600 256M Compact Flash Card JC686A

Opacity Shield Kit

System (std 0 // max 1) User Selection (min 0 // max 1)

HP MSR4060 Opcty Shld Kit JG602A
NOTE: See Configuration Note:1
Supported on the HP MSR4060 Routers (JG403A).

HP MSR4080 Opcty Shld Kit JG603A
NOTE: See Configuration Note:1
Supported on the HP MSR4080 Routers (JG402A).

Configuration Rules:

Note 1 If selected with a CTO Router Solution, Quantity 1 of JG586A#B01 must also be ordered.

Tamper Evidence Labels

System (std 0 // max 1) User Selection (min 0 // max 1)

HP 12mm x 60mm Tmpr-Evidence (100) Lbl JG586A
NOTE: See Configuration Note:1
Supported on the HP MSR4060/MSR4080 Routers (JG403A,JG402A).

Configuration Rules:

Note 1 If selected with a CTO Router Solution, Quantity 1 of JG602A#B01 or JG603A#B01 must also be ordered.

Remarks: Each JG602A or JG603A would use 1 of JG586A.

Technical Specifications

HP MSR4060 Router Chassis (JG403A)

I/O ports and slots	2 MPU (Main Processing Unit) slots 1 SPU (Service Processing Unit) slot 6 HMIM slots 4 Power Supply slots	
Physical characteristics	**Dimensions**	17.32(w) x 18.9(d) x 6.89(h) in (44 x 48 x 17.50 cm) (4U height)
	Weight	45.52 lb (20.65 kg)
Memory and processor	MPU-100, 2 cores RISC @ 1 GHz, 512 MB flash capacity, 2 GB DDR3 SDRAM	
Mounting	Desktop or can be mounted in a EIA standard 19-inch telco rack when used with the rack-mount kit in the package.	
Performance	**Throughput**	36 Mpps (64-byte packets)
	Routing table size	1000000 entries (IPv4), 1000000 entries (IPv6)
	Forwarding table size	1000000 entries (IPv4), 1000000 entries (IPv6)
	GRE tunnels	4000, max
Environment	**Operating temperature**	32ºF to 113ºF (0ºC to 45ºC)
	Operating relative humidity	5% to 90%, noncondensing
	Nonoperating/Storage temperature	-40ºF to 158ºF (-40ºC to 70ºC)
	Nonoperating/Storage relative humidity	5% to 90%, noncondensing
	Altitude	up to 16,404 ft (5 km)
Electrical characteristics	**Frequency**	50/60 Hz
	Maximum heat dissipation	285/347 BTU/hr (300.67/366.09 kJ/hr), lower number is with SPU-100 module installed; higher number is for SPU-200
	Voltage	100-120/200-240 VAC
	Maximum power rating	300 W
	PoE power	480 W
	Notes	Maximum power rating and maximum heat dissipation are the worst-case theoretical maximum numbers provided for planning the infrastructure with fully loaded PoE (if equipped), 100% traffic, all ports plugged in, and all modules populated. PoE Power is the power supplied by the internal power supply, it is dependent on the type and quantity of power supplies and may be supplemented with the use of a External Power Supply (EPS). No default power supply is included in the chassis; a minimum of one/maximum of four power supplies should be ordered.
Reliability	**MTBF (years)**	178.66
Safety	UL 60950-1; AS/NZS 60950; EN 60825-1 Safety of Laser Products-Part 1; EN 60825-2 Safety of Laser Products-Part 2; IEC 60950-1; CAN/CSA-C22.2 No. 60950-1-03; EN 60950-1/A11; FDA 21 CFR Subchapter J	
Emissions	EN 61000-4-11:2004; ANSI C63.4-2009; AS/NZS CISPR 22:2009; CISPR 22 Ed2.0 2008-09; EN 55022:2010; EN 61000-3-3:2008; GB 9254-2008; IEC 61000-3-2 Ed3.0 (2009-02); IEC 61000-3-3 Ed2.0 (2008-06); VCCI V-4/2012.04; CISPR 24 Ed2.0 2010-08; EN 55024:2010; EN 61000-3-2:2006+A1:2009+A2:2009 ; EN 61000-4-2:2009; EN 61000-4-29:2000; EN 61000-4-3:2006; EN 61000-4-4:2012; EN 61000-4-5:2006; EN 61000-4-6:2009; EN 61000-4-8:2010; ETSI EN 300 386 V1.6.1(2012-09); FCC 47 CFR Part 15 (latest current version); ICES-003 Issue 5; IEC 61000-4-11 Ed2.0 (2004-03); IEC 61000-4-2 Ed2.0 (2008-12); IEC 61000-4-29 Ed1.0 (2000-08); IEC 61000-4-3 Ed3.2 (2010-04); IEC 61000-4-4 Ed3.0 (2012-04); IEC 61000-4-5 Ed2.0 (2005-11); IEC 61000-4-6 Ed3.0 (2008-10); IEC 61000-4-8 Ed2.0 (2009-09); VCCI V-3/2013.04	

Technical Specifications

Telecom	FCC part 68; CS-03
Management	IMC - Intelligent Management Center; command-line interface; limited command-line interface; configuration menu; out-of-band management (RJ-45 Ethernet); SNMP Manager; Telnet; RMON1; FTP; in-line and out-of-band; modem interface; out-of-band management (serial RS-232C or Micro USB); IEEE 802.3 Ethernet MIB
Services	3-year, parts only, global next-day advance exchange (UW075E) 3-year, 4-hour onsite, 13x5 coverage for hardware (UW076E) 3-year, 4-hour onsite, 24x7 coverage for hardware (UW006E) 3-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 SW phone support and SW updates (UW009E) 3-year, 24x7 SW phone support, software updates (UW012E) 1-year, post-warranty, 4-hour onsite, 13x5 coverage for hardware (HR554E) 1-year, post-warranty, 4-hour onsite, 24x7 coverage for hardware (HR555E) 1-year, post-warranty, 4-hour onsite, 24x7 coverage for hardware, 24x7 software phone support (HR556E) 4-year, 4-hour onsite, 13x5 coverage for hardware (UW077E) 4-year, 4-hour onsite, 24x7 coverage for hardware (UW007E) 4-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 software phone (UW010E) 4-year, 24x7 SW phone support, software updates (UW013E) 5-year, 4-hour onsite, 13x5 coverage for hardware (UW078E) 5-year, 4-hour onsite, 24x7 coverage for hardware (UW008E) 5-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 software phone (UW011E) 5-year, 24x7 SW phone support, software updates (UW014E) 3 Yr 6 hr Call-to-Repair Onsite (UW079E) 4 Yr 6 hr Call-to-Repair Onsite (UW080E) 5 Yr 6 hr Call-to-Repair Onsite (UW081E) 1-year, 6 hour Call-To-Repair Onsite for hardware (HR558E) 1-year, 24x7 software phone support, software updates (HR557E) Refer to the HP website at **www.hp.com/networking/services** for details on the service-level descriptions and product numbers. For details about services and response times in your area, please contact your local HP sales office.

HP MSR4080 Router Chassis (JG402A)

I/O ports and slots	2 MPU (Main Processing Unit) slots 1 SPU (Service Processing Unit) slot 8 HMIM slots 4 Power Supply slots	
Physical characteristics	**Dimensions**	17.32(w) x 18.9(d) x 8.64(h) in (44 x 48 x 21.95 cm) (5U height)
	Weight	49.93 lb (22.65 kg)
Memory and processor	MPU-100, 2 cores RISC @ 1 GHz, 512 MB flash capacity, 2 GB DDR3 SDRAM	
Mounting	Desktop or can be mounted in a EIA-standard 19 in. telco rack when used with the rack-mount kit in the package	
Performance	**Throughput**	36 Mpps (64-byte packets)
	Routing table size	1000000 entries (IPv4), 1000000 entries (IPv6)
	Forwarding table size	1000000 entries (IPv4), 1000000 entries (IPv6)
	GRE tunnels	4000, max
Environment	**Operating temperature**	32ºF to 113ºF (0ºC to 45ºC)
	Operating relative humidity	5% to 90%, noncondensing
	Nonoperating/Storage temperature	-40ºF to 158ºF (-40ºC to 70ºC)

Technical Specifications

	Nonoperating/Storage relative humidity	5% to 90%, noncondensing
	Altitude	up to 16,404 ft (5 km)
Electrical characteristics	**Frequency**	50/60 Hz
	Maximum heat dissipation	297/358 BTU/hr (313.33/377.69 kJ/hr), lower number is with SPU-100 module installed; higher number is for SPU-200
	Voltage	100-120/200-240 VAC
	Maximum power rating	300 W
	PoE power	480 W
	Notes	Maximum power rating and maximum heat dissipation are the worst-case theoretical maximum numbers provided for planning the infrastructure with fully loaded PoE (if equipped), 100% traffic, all ports plugged in, and all modules populated. PoE Power is the power supplied by the internal power supply, it is dependent on the type and quantity of power supplies and may be supplemented with the use of a External Power Supply (EPS). No default power supply is included in the chassis; a minimum of one/maximum of our power supplies should be ordered.
Reliability	**MTBF (years)**	178.66
Safety	UL 60950-1; AS/NZS 60950; EN 60825-1 Safety of Laser Products-Part 1; EN 60825-2 Safety of Laser Products-Part 2; IEC 60950-1; CAN/CSA-C22.2 No. 60950-1-03; EN 60950-1/A11; FDA 21 CFR Subchapter J	
Emissions	EN 61000-4-11:2004; ANSI C63.4-2009; AS/NZS CISPR 22:2009; CISPR 22 Ed2.0 2008-09; EN 55022:2010; EN 61000-3-3:2008; GB 9254-2008; IEC 61000-3-2 Ed3.0 (2009-02); IEC 61000-3-3 Ed2.0 (2008-06); VCCI V-4/2012.04; CISPR 24 Ed2.0 2010-08; EN 55024:2010; EN 61000-3-2:2006+A1:2009+A2:2009 ; EN 61000-4-2:2009; EN 61000-4-29:2000; EN 61000-4-3:2006; EN 61000-4-4:2012; EN 61000-4-5:2006; EN 61000-4-6:2009; EN 61000-4-8:2010; ETSI EN 300 386 V1.6.1(2012-09); FCC 47 CFR Part 15 (latest current version); ICES-003 Issue 5; IEC 61000-4-11 Ed2.0 (2004-03); IEC 61000-4-2 Ed2.0 (2008-12); IEC 61000-4-29 Ed1.0 (2000-08); IEC 61000-4-3 Ed3.2 (2010-04); IEC 61000-4-4 Ed3.0 (2012-04); IEC 61000-4-5 Ed2.0 (2005-11); IEC 61000-4-6 Ed3.0 (2008-10); IEC 61000-4-8 Ed2.0 (2009-09); VCCI V-3/2013.04	
Telecom	FCC part 68; CS-03	
Management	IMC - Intelligent Management Center; command-line interface; limited command-line interface; configuration menu; out-of-band management (RJ-45 Ethernet); SNMP Manager; Telnet; RMON1; FTP; in-line and out-of-band; modem interface; out-of-band management (serial RS-232C or Micro USB); IEEE 802.3 Ethernet MIB	
Services	3-year, parts only, global next-day advance exchange (UW075E) 3-year, 4-hour onsite, 13x5 coverage for hardware (UW076E) 3-year, 4-hour onsite, 24x7 coverage for hardware (UW006E) 3-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 SW phone support and SW updates (UW009E) 3-year, 24x7 SW phone support, software updates (UW012E) 1-year, post-warranty, 4-hour onsite, 13x5 coverage for hardware (HR554E) 1-year, post-warranty, 4-hour onsite, 24x7 coverage for hardware (HR555E) 1-year, post-warranty, 4-hour onsite, 24x7 coverage for hardware, 24x7 software phone support (HR556E) 4-year, 4-hour onsite, 13x5 coverage for hardware (UW077E) 4-year, 4-hour onsite, 24x7 coverage for hardware (UW007E) 4-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 software phone (UW010E) 4-year, 24x7 SW phone support, software updates (UW013E) 5-year, 4-hour onsite, 13x5 coverage for hardware (UW078E) 5-year, 4-hour onsite, 24x7 coverage for hardware (UW008E) 5-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 software phone (UW011E)	

5-year, 24x7 SW phone support, software updates (UW014E)
3 Yr 6 hr Call-to-Repair Onsite (UW079E)
4 Yr 6 hr Call-to-Repair Onsite (UW080E)
5 Yr 6 hr Call-to-Repair Onsite (UW081E)
1-year, 6 hour Call-To-Repair Onsite for hardware (HR558E)
1-year, 24x7 software phone support, software updates (HR557E)

Refer to the HP website at **www.hp.com/networking/services** for details on the service-level descriptions and product numbers. For details about services and response times in your area, please contact your local HP sales office.

Standards and protocols (applies to all products in series)

BGP
RFC 1163 Border Gateway Protocol (BGP)
RFC 1267 Border Gateway Protocol 3 (BGP-3)
RFC 1657 Definitions of Managed Objects for BGPv4
RFC 1771 BGPv4
RFC 1772 Application of the BGP
RFC 1773 Experience with the BGP-4 Protocol
RFC 1774 BGP-4 Protocol Analysis
RFC 1965 BGP-4 confederations
RFC 1997 BGP Communities Attribute
RFC 2439 BGP Route Flap Damping
RFC 2547 BGP/MPLS VPNs
RFC 2796 BGP Route Reflection
RFC 2842 Capability Advertisement with BGP-4
RFC 2858 BGP-4 Multi-Protocol Extensions
RFC 2918 Route Refresh Capability
RFC 3065 Autonomous System Confederations for BGP
RFC 3107 Support BGP carry Label for MPLS
RFC 3392 Capabilities Advertisement with BGP-4
RFC 4271 A Border Gateway Protocol 4 (BGP-4)
RFC 4273 Definitions of Managed Objects for BGP-4
RFC 4274 BGP-4 Protocol Analysis
RFC 4275 BGP-4 MIB Implementation Survey
RFC 4276 BGP-4 Implementation Report
RFC 4277 Experience with the BGP-4 Protocol
RFC 4360 BGP Extended Communities Attribute
RFC 4456 BGP Route Reflection: An Alternative to Full Mesh Internal BGP (IBGP)
RFC 4724 Graceful Restart Mechanism for BGP
RFC 4760 Multiprotocol Extensions for BGP-4
RFC1998 An Application of the BGP Community Attribute in Multi-home Routing

Denial of service protection
CPU DoS Protection
Rate Limiting by ACLs

Device management
RFC 1155 Structure and Mgmt Information (SMIv1)
RFC 1157 SNMPv1/v2c
RFC 1305 NTPv3
RFC 1591 DNS (client)
RFC 1902 (SNMPv2)
RFC 1908 (SNMP v1/2 Coexistence)
RFC 1945 Hypertext Transfer Protocol -- HTTP/1.0
RFC 2271 Framework
RFC 2573 (SNMPv3 Applications)
RFC 2576 (Coexistence between SNMP V1, V2, V3)
RFC 2578-2580 SMIv2
RFC 2579 (SMIv2 Text Conventions)
RFC 2580 (SMIv2 Conformance)
RFC 3416 (SNMP Protocol Operations v2)
RFC 3417 (SNMP Transport Mappings)

General protocols
RFC 768 UDP
RFC 783 TFTP Protocol (revision 2)
RFC 791 IP
RFC 792 ICMP
RFC 793 TCP
RFC 826 ARP
RFC 896 Congestion Control in IP/TCP Internetworks
RFC 917 Internet Subnets
RFC 925 Multi-LAN Address Resolution
RFC 3036 LDP Specification
RFC 3037 LDP (Label Distribution Protocol) Applicability
RFC 3046 DHCP Relay Agent Information Option
RFC 3063 MPLS Loop Prevention Mechanism
RFC 3137 OSPF Stub Router Advertisement
RFC 3168 The Addition of Explicit Congestion Notification (ECN) to IP
RFC 3215 LDP State Machine
RFC 4451 BGP MULTI_EXIT_DISC (MED) Considerations
RFC 4486 Subcodes for BGP Cease Notification Message
RFC 4541 Considerations for Internet Group Management Protocol (IGMP) and Multicast Listener Discovery (MLD) Snooping Switches
RFC 4553 Structure-Agnostic Time Division Multiplexing (TDM) over Packet (SAToP)
RFC 4562 MAC-Forced

Technical Specifications

RFC 950 Internet Standard Subnetting Procedure
RFC 951 BOOTP
RFC 959 File Transfer Protocol (FTP)
RFC 1027 Proxy ARP
RFC 1048 BOOTP (Bootstrap Protocol) vendor information extensions
RFC 1058 RIPv1
RFC 1091 Telnet Terminal-Type Option
RFC 1093 NSFNET routing architecture
RFC 1141 Incremental updating of the Internet checksum
RFC 1142 OSI IS-IS Intra-domain Routing Protocol
RFC 1166 Internet address used by Internet Protocol (IP)
RFC 1191 Path MTU discovery
RFC 1195 OSI ISIS for IP and Dual Environments
RFC 1213 Management Information Base for Network Management of TCP/IP-based internets
RFC 1253 (OSPF v2)
RFC 1305 NTPv3 (IPv4 only)
RFC 1321 The MD5 Message-Digest Algorithm
RFC 1323 TCP Extensions for High Performance
RFC 1349 Type of Service
RFC 1350 TFTP Protocol (revision 2)
RFC 1449 Transport Mappings for version 2 of the Simple Network Management Protocol (SNMPv2)
RFC 1519 CIDR
RFC 1542 BOOTP Extensions
RFC 1542 Clarifications and Extensions for the Bootstrap Protocol
RFC 1624 Incremental Internet Checksum
RFC 1631 NAT
RFC 1701 Generic Routing Encapsulation
RFC 1702 Generic Routing Encapsulation over IPv4 networks
RFC 1721 RIP-2 Analysis
RFC 1722 RIP-2 Applicability
RFC 1723 RIP v2
RFC 1724 RIP Version 2 MIB
RFC 3246 Expedited Forwarding PHB
RFC 3268 Advanced Encryption Standard (AES) Ciphersuites for Transport Layer Security (TLS)
RFC 3277 IS-IS Transient Blackhole Avoidance
RFC 3279 Algorithms and Identifiers for the Internet X.509 Public Key Infrastructure Certificate and Certificate Revocation List (CRL) Profile
RFC 3280 Internet X.509 Public Key Infrastructure Certificate and Certificate Revocation List (CRL) Profile
RFC 3319 Dynamic Host Configuration Protocol (DHCPv6) Options for Session Initiation Protocol (SIP) Servers
RFC 3359 Reserved Type, Length and Value (TLV) Codepoints in Intermediate System to Intermediate System
RFC 3392 Support BGP capabilities advertisement
RFC 3443 Time To Live (TTL) Processing in Multi-Protocol Label Switching (MPLS) Networks
RFC 3478 Graceful Restart Mechanism for Label Distribution Protocol
RFC 3479 Fault Tolerance for the Label Distribution Protocol (LDP)
RFC 3509 OSPF ABR Behavior
RFC 3526 More Modular Exponential (MODP) Diffie-Hellman groups for Internet Key Exchange (IKE)
RFC 3564 Requirements for Support of Differentiated Services-aware MPLS Traffic Engineering
RFC 3567 Intermediate System to Intermediate System (IS-IS) Cryptographic Authentication
RFC 3584 Coexistence between Version 1 and Version 2 of the Internet-standard Network Management Framework
RFC 3602 The AES-CBC Cipher Algorithm and Its Use with IPSec
RFC 3612 Applicability Statement for Restart Mechanisms for the Label Distribution Protocol (LDP)
RFC 3623 Graceful OSPF Restart
Forwarding: A Method for Subscriber Separation on an Ethernet Access Network
RFC 4576 Using a Link State Advertisement (LSA) Options Bit to Prevent Looping in BGP/MPLS IP Virtual Private Networks (VPNs)
RFC 4577 OSPF as the Provider/Customer Edge Protocol for BGP/MPLS IP Virtual Private Networks (VPNs)
RFC 4594 Configuration Guidelines for DiffServ Service Classes
RFC 4601 Protocol Independent Multicast - Sparse Mode (PIM-SM): Protocol Specification (Revised)
RFC 4618 Encapsulation Methods for Transport of PPP/High-Level Data Link Control (HDLC) over MPLS Networks
RFC 4619 Encapsulation Methods for Transport of Frame Relay over Multiprotocol Label Switching (MPLS) Networks
RFC 4632 Classless Inter-domain Routing (CIDR): The Internet Address Assignment and Aggregation Plan
RFC 4659 BGP-MPLS IP Virtual Private Network (VPN) Extension for IPv6 VPN
RFC 4664 Framework for Layer 2 Virtual Private Networks (L2VPNs)
RFC 4665 Service Requirements for Layer 2 Provider-Provisioned Virtual Private Networks
RFC 4741 NETCONF Configuration Protocol
RFC 4742 Using the NETCONF Configuration Protocol over Secure SHell (SSH)
RFC 4743 Using NETCONF over the Simple Object Access Protocol (SOAP)
RFC 4765 Service Requirements for Layer 2 Provider Provisioned Virtual Private Networks
RFC 4781 Graceful Restart Mechanism for BGP with MPLS
RFC 4787 Network Address Translation (NAT) Behavioral Requirements for Unicast UDP

Technical Specifications

Extension
RFC 1777 Lightweight Directory Access Protocol
RFC 1812 IPv4 Routing
RFC 1825 Security Architecture for the Internet Protocol
RFC 1826 IP Authentication Header
RFC 1827 IP Encapsulating Security Payload (ESP)
RFC 1829 The ESP DES-CBC Transform
RFC 1945 Hypertext Transfer Protocol -- HTTP/1.0
RFC 1966 BGP Route Reflection An alternative to full mesh IBGP
RFC 1981 Path MTU Discovery for IP version 6
RFC 2003 IP Encapsulation within IP
RFC 2018 TCP Selective Acknowledgement Options
RFC 2082 RIP-2 MD5 Authentication
RFC 2104 HMAC: Keyed-Hashing for Message Authentication
RFC 2131 DHCP
RFC 2132 DHCP Options and BOOTP Vendor Extensions
RFC 2138 Remote Authentication Dial In User Service (RADIUS)
RFC 2236 IGMP Snooping
RFC 2246 The TLS Protocol Version 1.0
RFC 2251 Lightweight Directory Access Protocol (v3)
RFC 2252 Lightweight Directory Access Protocol (v3): Attribute Syntax Definitions
RFC 2283 MBGP
RFC 2309 Recommendations on queue management and congestion avoidance in the Internet
RFC 2338 VRRP
RFC 2451 The ESP CBC-Mode Cipher Algorithms
RFC 2453 RIPv2
RFC 2474 Definition of the Differentiated Services Field (DS Field) in the IPv4 and IPv6 Headers
RFC 2510 Internet X.509 Public Key Infrastructure Certificate Management Protocols
RFC 2519 A Framework for Inter-
RFC 3646 DNS Configuration options for Dynamic Host Configuration Protocol for IPv6 (DHCPv6)
RFC 3662 A Lower Effort Per-Domain Behavior (PDB) for Differentiated Services
RFC 3704 Unicast Reverse Path Forwarding (URPF)
RFC 3706 A Traffic-Based Method of Detecting Dead Internet Key Exchange (IKE) Peers
RFC 3719 Recommendations for Interoperable Networks using Intermediate System to Intermediate System (IS-IS)
RFC 3736 Stateless Dynamic Host Configuration Protocol (DHCP) Service for IPv6
RFC 3768 Virtual Router Redundancy Protocol (VRRP)
RFC 3782 The NewReno Modification to TCP's Fast Recovery Algorithm
RFC 3786 Extending the Number of IS-IS LSP Fragments Beyond the 256 Limit
RFC 3787 Recommendations for Interoperable IP Networks using Intermediate System to Intermediate System (IS-IS)
RFC 3810 Multicast Listener Discovery Version 2 (MLDv2) for IPv6
RFC 3812 Multiprotocol Label Switching (MPLS) Traffic Engineering (TE) Management Information Base (MIB)
RFC 3815 Definitions of Managed Objects for the Multiprotocol Label Switching (MPLS), Label Distribution Protocol (LDP)
RFC 3847 Restart signaling for IS-IS
RFC 3916 Requirements for Pseudo-Wire Emulation Edge-to-Edge (PWE3)
RFC 3948 UDP Encapsulation of IPsec ESP Packets
RFC 3973 Protocol Independent Multicast - Dense Mode (PIM-DM): Protocol Specification (Revised)
RFC 3985 Pseudo Wire Emulation Edge-to-Edge (PWE3) Architecture
RFC 4061 Benchmarking Basic
RFC 4798 Connecting IPv6 Islands over IPv4 MPLS Using IPv6 Provider Edge Routers (6PE)
RFC 4811 OSPF Out-of-Band Link State Database (LSDB) Resynchronization
RFC 4812 OSPF Restart Signaling
RFC 4813 OSPF Link-Local Signaling
RFC 4816 Pseudowire Emulation Edge-to-Edge (PWE3) Asynchronous Transfer Mode (ATM) Transparent Cell Transport Service
RFC 4835 Cryptographic Algorithm Implementation Requirements for Encapsulating Security Payload (ESP) and Authentication Header (AH)
RFC 4861 Neighbor Discovery for IP version 6 (IPv6)
RFC 4862 IPv6 Stateless Address Autoconfiguration
RFC 4878 "Definitions and Managed Objects for Operations, Administration, and Maintenance (OAM) Functions on
RFC 4893 BGP Support for Four-octet AS Number Space
RFC 4940 IANA Considerations for OSPF
RFC 4941 Privacy Extensions for Stateless Address Autoconfiguration in IPv6
RFC 5007 DHCPv6 Leasequery
RFC 5036 LDP Specification
RFC 5065 Autonomous System Confederations for BGP
RFC 5086 Structure-Aware Time Division Multiplexed (TDM) Circuit Emulation Service over Packet Switched Network (CESoPSN)
RFC 5095 Deprecation of Type 0 Routing Headers in IPv6
RFC 5130 A Policy Control Mechanism in IS-IS Using Administrative Tags
RFC 5187 OSPFv3 Graceful Restart
RFC 5214 Intra-Site Automatic Tunnel Addressing Protocol (ISATAP)
RFC 5254 Requirements for Multi-Segment Pseudowire Emulation Edge-to-Edge (PWE3)
RFC 5277 NETCONF Event

Technical Specifications

Domain Route Aggregation
RFC 2529 Transmission of IPv6 over IPv4 Domains without Explicit Tunnels
RFC 2548 (MS-RAS-Vendor only)
RFC 2581 TCP Congestion Control
RFC 2597 Assured Forwarding PHB Group
RFC 2598 An Expedited Forwarding PHB
RFC 2616 HTTP Compatibility v1.1
RFC 2661 L2TP
RFC 2663 NAT Terminology and Considerations
RFC 2694 DNS extensions to Network Address Translators (DNS_ALG)
RFC 2698 A Two Rate Three Color Marker
RFC 2716 PPP EAP TLS Authentication Protocol
RFC 2747 RSVP Cryptographic Authentication
RFC 2763 Dynamic Name-to-System ID mapping
RFC 2784 Generic Routing Encapsulation (GRE)
RFC 2827 Network Ingress Filtering: Defeating Denial of Service Attacks Which Employ IP Source Address Spoofing
RFC 2865 Remote Authentication Dial In User Service (RADIUS)
RFC 2866 RADIUS Accounting
RFC 2868 RADIUS Attributes for Tunnel Protocol Support
RFC 2869 RADIUS Extensions
RFC 2884 Performance Evaluation of Explicit Congestion Notification (ECN) in IP Networks.
RFC 2963 A Rate Adaptive Shaper for Differentiated Services
RFC 2966 Domain-wide Prefix Distribution with Two-Level IS-IS
RFC 2973 IS-IS Mesh Groups
RFC 2993 Architectural Implications of NAT
RFC 3011 The IPv4 Subnet Selection Option for DHCP
RFC 3022 Traditional IP Network Address Translator (Traditional NAT)
RFC 3027 Protocol Complications with the IP Network Address Translator
OSPF Single Router Control Plane Convergence
RFC 4062 OSPF Benchmarking Terminology and Concepts
RFC 4063 Considerations When Using Basic OSPF Convergence Benchmarks
RFC 4109 Algorithms for Internet Key Exchange version 1 (IKEv1)
RFC 4133 Entity MIB (Version 3)
RFC 4182 Removing a Restriction on the use of MPLS Explicit NULL
RFC 4214 Intra-Site Automatic Tunnel Addressing Protocol (ISATAP)
RFC 4222 Prioritized Treatment of Specific OSPF Version 2 Packets and Congestion Avoidance
RFC 4250 The Secure Shell (SSH) Protocol Assigned Numbers
RFC 4251 The Secure Shell (SSH) Protocol Architecture
RFC 4252 The Secure Shell (SSH) Authentication Protocol
RFC 4253 The Secure Shell (SSH) Transport Layer Protocol
RFC 4254 The Secure Shell (SSH) Connection Protocol
RFC 4291 IP Version 6 Addressing Architecture
RFC 4305 Cryptographic Algorithm Implementation Requirements for Encapsulating Security Payload (ESP) and Authentication Header (AH)
RFC 4364 BGP/MPLS IP Virtual Private Networks (VPNs)
RFC 4365 Applicability Statement for BGP/MPLS IP Virtual Private Networks (VPNs)
RFC 4381 Analyses of the Security of BGP/MPLS IP VPNs
RFC 4382 MPLS/BGP Layer 3 Virtual Private Network (VPN) Management Information Base
RFC 4385 Pseudowire Emulation Edge-to-Edge (PWE3) Control Word for Use over an MPLS PSN
RFC 4419 Diffie-Hellman Group Exchange for the Secure Shell (SSH) Transport Layer Protocol
RFC 4446 IANA Allocations for Pseudowire Edge to Edge Emulation (PWE3)
RFC 4447 Pseudowire Setup and Notifications
RFC 5280 Internet X.509 Public Key Infrastructure Certificate and Certificate Revocation List (CRL) Profile
RFC 5286 Basic Specification for IP Fast Reroute: Loop-Free Alternates
RFC 5287 Control Protocol Extensions for the Setup of Time-Division Multiplexing (TDM) Pseudowires in MPLS Networks
RFC 5301 Dynamic Hostname Exchange Mechanism for IS-IS
RFC 5302 Domain-Wide Prefix Distribution with Two-Level IS-IS
RFC 5304 Intermediate System to Intermediate System (IS-IS) Cryptographic Authentication
RFC 5306 Restart Signaling for IS-IS
RFC 5308 Routing IPv6 with IS-IS
RFC 5309 Point-to-Point Operation over LAN in Link State Routing Protocols
RFC 5381 Experience of Implementing NETCONF over SOAP
RFC 5382 The IP Network Address Translator (NAT)
RFC 5398 Autonomous System (AS) Number Reservation for Documentation Use
RFC 5492 Capabilities Advertisement with BGP-4
RFC 5508 NAT Behavioral Requirements for ICMP
RFC 5539 NETCONF over Transport Layer Security (TLS)
RFC 5613 OSPF Link-Local Signaling
RFC 5659 An Architecture for Multi-Segment Pseudowire Emulation Edge-to-Edge
RFC 5798 Virtual Router Redundancy Protocol (VRRP) Version 3 for IPv4 and IPv6
RFC 5880 Bidirectional Forwarding Detection
RFC 5881 BFD for IPv4 and IPv6 (Single Hop)
RFC 5882 Generic Application of BFD
RFC 5883 BFD for Multihop Paths
RFC 5905 Network Time Protocol Version 4: Protocol and

RFC 3031 Multiprotocol Label Switching Architecture
RFC 3032 MPLS Label Stack Encoding
Maintenance Using the Label Distribution Protocol (LDP)
RFC 4448 Encapsulation Methods for Transport of Ethernet over MPLS Networks
Algorithms Specification
RFC 854 Telnet Protocol Specification
RFC 856 Telnet Binary Transmission

IP multicast
RFC 1112 IGMP
RFC 2362 PIM Sparse Mode
RFC 2710 Multicast Listener Discovery (MLD) for IPv6
RFC 2934 Protocol Independent Multicast MIB for IPv4
RFC 3376 IGMPv3
RFC 3376 IGMPv3 (host joins only)
RFC 5059 Bootstrap Router (BSR) Mechanism for Protocol Independent Multicast (PIM)

IPv6
RFC 2080 RIPng for IPv6
RFC 2460 IPv6 Specification
RFC 2473 Generic Packet Tunneling in IPv6
RFC 2475 IPv6 DiffServ Architecture
RFC 2529 Transmission of IPv6 Packets over IPv4
RFC 2545 Use of MP-BGP-4 for IPv6
RFC 2553 Basic Socket Interface Extensions for IPv6
RFC 2740 OSPFv3 for IPv6
RFC 2893 Transition Mechanisms for IPv6 Hosts and Routers
RFC 3056 Connection of IPv6 Domains via IPv4 Clouds
RFC 3162 RADIUS and IPv6
RFC 3315 DHCPv6 (client and relay)
RFC 5340 OSPF for IPv6

MIBs
RFC 1213 MIB II
RFC 1493 Bridge MIB
RFC 1724 RIPv2 MIB
RFC 1850 OSPFv2 MIB
RFC 1907 SNMPv2 MIB
RFC 2011 SNMPv2 MIB for IP
RFC 2012 SNMPv2 MIB for TCP
RFC 2013 SNMPv2 MIB for UDP
RFC 2096 IP Forwarding Table MIB
RFC 2233 Interfaces MIB
RFC 2273 SNMP-NOTIFICATION-MIB
RFC 2571 SNMP Framework MIB
RFC 2572 SNMP-MPD MIB
RFC 2573 SNMP-Notification MIB
RFC 2574 SNMP USM MIB
RFC 2674 802.1p and IEEE 802.1Q Bridge MIB
RFC 2737 Entity MIB (Version 2)
RFC 2863 The Interfaces Group MIB
RFC 3813 MPLS LSR MIB

Network management
IEEE 802.1D (STP)
RFC 1098 Simple Network Management Protocol (SNMP)
RFC 1158 Management Information Base for network management of TCP/IP-based internets: MIB-II
RFC 1212 Concise MIB definitions
RFC 1215 Convention for defining traps for use with the SNMP
RFC 1389 RIPv2 MIB Extension
RFC 1448 Protocol Operations for version 2 of the Simple Network Management Protocol (SNMPv2)
RFC 1450 Management Information Base (MIB) for version 2 of the Simple Network Management Protocol (SNMPv2)
RFC 1902 Structure of Management Information for Version 2 of the Simple Network Management Protocol (SNMPv2)
RFC 1903 SNMPv2 Textual Conventions
RFC 1904 SNMPv2 Conformance
RFC 1905 SNMPv2 Protocol Operations
RFC 1906 SNMPv2 Transport Mappings
RFC 1908 Coexistence between Version 1 and Version 2 of the Internet-standard Network Management Framework
RFC 1918 Private Internet Address Allocation
RFC 2037 Entity MIB using SMIv2
RFC 2261 An Architecture for Describing SNMP Management Frameworks
RFC 2262 Message Processing and Dispatching for the Simple Network Management Protocol (SNMP)
RFC 2263 SNMPv3 Applications
RFC 2264 User-based Security Model (USM) for version 3 of the Simple Network Management Protocol (SNMPv3)
RFC 2265 View-based Access Control Model (VACM) for the Simple Network Management Protocol (SNMP)
RFC 2272 SNMPv3 Management Protocol
RFC 2273 SNMPv3 Applications
RFC 2274 USM for SNMPv3
RFC 2275 VACM for SNMPv3
RFC 2575 SNMPv3 View-based Access Control Model (VACM)
RFC 3164 BSD syslog Protocol
RFC 3411 An Architecture for Describing Simple Network Management Protocol (SNMP) Management Frameworks
RFC 3412 Message Processing and Dispatching for the Simple Network Management Protocol (SNMP)
RFC 3413 Simple Network Management Protocol (SNMP) Applications
RFC 3414 SNMPv3 User-based Security Model (USM)
RFC 3415 View-based Access Control Model (VACM) for the Simple Network Management Protocol (SNMP)
RFC 3418 Management Information Base (MIB) for the Simple Network Management Protocol (SNMP)

Technical Specifications

OSPF
RFC 1245 OSPF protocol analysis
RFC 1246 Experience with OSPF
RFC 1583 OSPFv2
RFC 1587 OSPF NSSA
RFC 1765 OSPF Database Overflow
RFC 1850 OSPFv2 Management Information Base (MIB), traps
RFC 2328 OSPFv2
RFC 2370 OSPF Opaque LSA Option
RFC 3101 OSPF NSSA

QoS/CoS
IEEE 802.1P (CoS)
RFC 2474 DS Field in the IPv4 and IPv6 Headers
RFC 2475 DiffServ Architecture
RFC 2597 DiffServ Assured Forwarding (AF)
RFC 2598 DiffServ Expedited Forwarding (EF)
RFC 2697 A Single Rate Three Color Marker
RFC 3168 The Addition of Explicit Congestion Notification (ECN) to IP
RFC 3247 Supplemental Information for the New Definition of the EF PHB (Expedited Forwarding Per-Hop Behavior)
RFC 3260 New Terminology and Clarifications for DiffServ

Security
IEEE 802.1X Port Based Network Access Control
RFC 2082 RIP-2 MD5 Authentication
RFC 2104 Keyed-Hashing for Message Authentication
RFC 2138 RADIUS Authentication
RFC 2139 RADIUS Accounting
RFC 2408 Internet Security Association and Key Management Protocol (ISAKMP)
RFC 2409 The Internet Key Exchange (IKE)
RFC 2412 The OAKLEY Key Determination Protocol
RFC 2459 Internet X.509 Public Key Infrastructure Certificate and CRL Profile
RFC 2818 HTTP Over TLSR
FC 2865 RADIUS Authentication
RFC 2866 RADIUS Accounting
RFC 3579 RADIUS Support For Extensible Authentication Protocol (EAP)
RFC 3580 IEEE 802.1X Remote Authentication Dial In User Service (RADIUS) Usage Guidelines

VPN
RFC 1828 IP Authentication using Keyed MD5
RFC 1853 IP in IP Tunneling
RFC 2401 Security Architecture for the Internet Protocol
RFC 2402 IP Authentication Header
RFC 2403 The Use of HMAC-MD5-96 within ESP and AH
RFC 2404 The Use of HMAC-SHA-1-96 within ESP and AH
RFC 2405 The ESP DES-CBC Cipher Algorithm With Explicit IV
RFC 2406 IP Encapsulating Security Payload (ESP)
RFC 2407 The Internet IP Security Domain of Interpretation for ISAKMP
RFC 2410 The NULL Encryption Algorithm and Its Use With IPSec
RFC 2411 IP Security Document Roadmap
RFC 3948 - UDP Encapsulation of IPSec ESP Packets
RFC 4301 - Security Architecture for the Internet Protocol
RFC 4302 - IP Authentication Header (AH)
RFC 4303 - IP Encapsulating Security Payload (ESP)
RFC 4305 - Cryptographic Algorithm Implementation Requirements for ESP and AH

HP MSR4000 Router Series accessories

Transceivers

HP X115 100M SFP LC FX Transceiver	JD102B
HP X110 100M SFP LC LX Transceiver	JD120B
HP X110 100M SFP LC LH40 Transceiver	JD090A
HP X110 100M SFP LC LH80 Transceiver	JD091A
HP X120 1G SFP LC SX Transceiver	JD118B
HP X120 1G SFP LC LX Transceiver	JD119B
HP X125 1G SFP LC LH40 1310nm Transceiver	JD061A
HP X120 1G SFP LC LH40 1550nm Transceiver	JD062A
HP X125 1G SFP LC LH70 Transceiver	JD063B
HP X120 1G SFP LC LH100 Transceiver	JD103A
HP X120 1G SFP LC BX 10-U Transceiver	JD098B
HP X120 1G SFP LC BX 10-D Transceiver	JD099B
HP X130 10G SFP+ LC LRM Transceiver	JD093B
HP X130 10G SFP+ LC ER 40km Transceiver	JG234A
HP X240 10G SFP+ to SFP+ 0.65m Direct Attach Copper Cable	JD095C
HP X240 10G SFP+ to SFP+ 1.2m Direct Attach Copper Cable	JD096C
HP X240 10G SFP+ to SFP+ 3m Direct Attach Copper Cable	JD097C
HP X240 10G SFP+ to SFP+ 5m Direct Attach Copper Cable	JG081C

Cables

HP X200 V.24 DTE 3m Serial Port Cable	JD519A
HP X200 V.24 DCE 3m Serial Port Cable	JD521A
HP X200 V.35 DTE 3m Serial Port Cable	JD523A
HP X200 V.35 DCE 3m Serial Port Cable	JD525A
HP X200 X.21 DTE 3m Serial Port Cable	JD527A
HP X200 X.21 DCE 3m Serial Port Cable	JD529A
HP X260 RS449 3m DTE Serial Port Cable	JF825A
HP X260 RS449 3m DCE Serial Port Cable	JF826A
HP X260 RS530 3m DTE Serial Port Cable	JF827A
HP X260 RS530 3m DCE Serial Port Cable	JF828A
HP X260 Auxiliary Router Cable	JD508A
HP X260 E1 RJ45 3m Router Cable	JD509A
HP X260 E1 RJ45 20m Router Cable	JD517A
HP X260 E1 (2) BNC 75 ohm 3m Router Cable	JD175A
HP X260 E1 BNC 20m Router Cable	JD514A
HP X260 E1 2 BNC 75 ohm 40m Router Cable	JD516A
HP X260 E1 RJ45 BNC 75-120 ohm Conversion Router Cable	JD511A
HP X260 T1 Router Cable	JD518A
HP X260 T1 Voice Router Cable	JD535A
HP X260 8E1 BNC 75 ohm 3m Router Cable	JD512A
HP X260 T3/E3 Router Cable	JD531A
HP X260 E3-30 E3/T3 Router Cable	JD533A

Power Supply

HP X351 300W 100-240VAC to 12VDC Power Supply	JG527A
HP X351 300W -48/-60VDC to 12VDC Power Supply	JG528A
HP 5800 750W AC Power Supply	JC089A

Router Modules

Accessories

HP MSR4000 MPU-100 Main Processing Unit	JG412A
HP MSR4000 SPU-100 Service Processing Unit	JG413A
HP MSR4000 SPU-200 Service Processing Unit	JG414A
HP MSR G2 128-channel Voice Processing Module	JG417A
HP MSR 1-port E1 Voice HMIM Module	JG429A
HP MSR 2-port E1 Voice HMIM Module	JG431A
HP MSR 1-port T1 Voice HMIM Module	JG430A
HP MSR 2-port T1 Voice HMIM Module	JG432A
HP MSR 4-port FXS HMIM Module	JG446A
HP MSR 4-port FXO HMIM Module	JG447A
HP MSR 4-port E and M HMIM Module	JG448A
HP MSR 16-port FXS HMIM Module	JG434A
HP MSR 4-port Enhanced Sync / Async Serial HMIM Module	JG442A
HP MSR 8-port Enhanced Sync / Async Serial HMIM Module	JG443A
HP MSR 2-port E1 / CE1 / PRI HMIM Module	JG450A
HP MSR 4-port E1 / CE1 / PRI HMIM Module	JG451A
HP MSR 4-port E1 / Fractional E1 HMIM Module	JG453A
HP MSR 8-port E1 / CE1 / PRI (75ohm) HMIM Module	JG452A
HP MSR 2-port T1 / CT1 / PRI HMIM Module	JG456A
HP MSR 4-port T1 / Fractional T1 HMIM Module	JG457A
HP MSR 1-port E3 / CE3 / FE3 HMIM Module	JG436A
HP MSR 1-port T3 / CT3 / FT3 HMIM Module	JG435A
HP MSR 1-port OC-3c / STM-1c POS HMIM Module	JG438A
HP MSR 0.5U HMIM Adapter Module	JG415A
HP MSR 1U HMIM Adapter Module	JG416A
HP MSR 8-port 10/100/1000BASE-T / 2-port 1000BASE-X (Combo) Switch HMIM Module	JG741A
HP MSR 2-port Gig-T HMIM Module	JG420A
HP MSR 4-port Gig-T HMIM Module	JG421A
HP MSR 8-port Gig-T HMIM Module	JG422A
HP MSR 2-port 1000BASE-X HMIM Module	JG423A
HP MSR 4-port 1000BASE-X HMIM Module	JG424A
HP MSR 8-port 1000BASE-X HMIM Module	JG425A
HP MSR 24-port Gig-T Switch HMIM Module	JG426A
HP MSR 24-port Gig-T PoE Switch HMIM Module	JG427A
HP MSR 1-port OC-3 / STM-1 CPOS HMIM Module	JG428A
HP MSR Open Application Platform (OAP) with VMware vSphere MIM Module	JG532A
Memory	
HP X600 1G Compact Flash Card	JC684A
HP X600 512M Compact Flash Card	JC685A
HP X600 256M Compact Flash Card	JC686A
HP X610 2GB DDR3 SDRAM UDIMM Memory	JG529A
HP X610 4GB DDR3 SDRAM UDIMM Memory	JG530A

Summary of Changes

Date	Version History	Action	Description of Change:
06-Oct-2014	From Version 11 to 12	Changed	Configuration section updated
18-Aug-2014	From Version 10 to 11	Added	Added 4 new accessories: JG428A, JG432A, JG434A, JG741A
03-July-2014	From Version 9 to 10	Changed	Configuration menu updated.
10-June-2014	From Version 8 to 9	Added	Added two new Router Enclosure Options to Configuration as well as 10 new accessories: JG670A, JG420A, JG421A, JG422A, JG423A, JG424A, JG425A, JG426A, JG427A, JG528A.
10-Feb-2014	From Version 7 to 8	Changed	Key features was revised.
31-Jan-2014	From Version 6 to 7	Added	GRE tunnels was added to Technical Specifications.
22-Nov-2013	From Version 5 to 6	Changed	HIMM Modules and Cables were revised in Configuration.
12-Nov-2013	From Version 4 to 5	Changed	Power Supplies was revised in Configuration.
14-Oct-2013	From Version 3 to 4	Added	Overview images were added.
30-Sep-2013	From Version 2 to 3	Changed	Configuration was reorganized.
27-Sep-2013	From Version 1 to 2	Added	Configuration was added.

Summary of Changes

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